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ABSTRACT

This appendix to the Mathematical Problem Solving Project "Module Development and Formative Evaluation" contains trials 1 and 2 of the Organizing Lists quiz. Editorial feedback from teachers on the Organizing Lists booklet is given for trials 1 and 2. Editorial feedback from teachers on the Organizing Lists problem deck is given for trial 1. Frequency of students trying each problem in the Organizing Lists problem deck is given by difficulty level and by teacher group. (MP)

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TECHNICAL REPORT III: Module Development and Formative Evaluation

APPENDIX B - Organizing Lists Quizzes and Data

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MATHEMATICAL PROBLEM SOLVING PROJECT

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SE 020 918

TECHNICAL REPORT III - Appendix B
1. Organizing Lists Quiz - Trial I

Name _____ Date _____

Teacher _____

1. Here is a list of all the blocks in a set with different colors, different shapes, and different sizes.

Color	Shape	Size
green	square	large
green	square	small
green	circle	small
red	circle	large
red	circle	small
red	square	large
blue	square	large
blue	circle	small

How many circles are there? _____

How many green squares are there? _____

What different colors are the small circles? _____

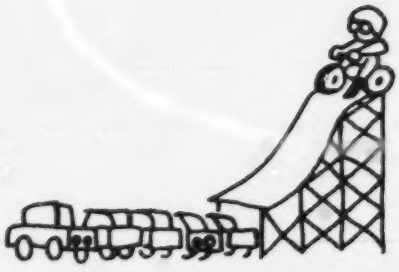
2. Jane has 2 dimes, 5 nickels, and 5 pennies. One of the ways she can make 25¢ out of these coins is listed below. Complete the list.

Dimes	Nickels	Pennies	Total
2	1	0	25¢

Form A

3. Two students have birthdays in the month of November. When their birth dates are subtracted you get 20. When their birth dates are added the sum is 34. Use a list and show when the two birthdays are. Please write down all your work.

4. Bob is going to jump over five cars on his motorcycle. Starting at the top of the ramp he reaches the speed of 2 miles per hour in the first second. Each second he reaches a speed which is two times his speed the second before. Bob takes 6 seconds to reach the end of the ramp. How fast is he going when he gets there?



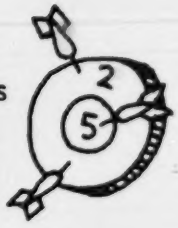
Name _____ Date _____

Teacher _____

1. Every bike in town has a license plate with the letter A, B, or C followed by a number 1, 2, or 3 followed by a small letter a or b. Some of the license plates are in the list below. Complete the list.

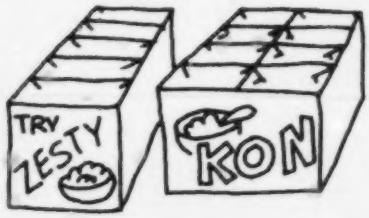
A1a, A2a, A3a, A1b, A2b, A3b, B1a,

2. Mark below each of the lists if it is complete or incomplete.



All odd numbers less than 10.	All numbers using 1, 2, 3	All possible scores using three darts
1	1 2 3	5 + 5 + 5 = 15
3	1 3 2	5 + 5 + 2 = 12
5	3 2 1	2 + 2 + 2 = 6
7	2 1 3	
9	2 3 1	
Complete Incomplete (circle One)	Complete Incomplete (circle one)	Complete Incomplete (circle one)

3. Each carton of Zesty cereal contains 5 boxes. Each carton of Kon cereal contains 8 boxes. How many cartons of each kind of cereal are needed to have exactly 60 boxes of cereal including both kinds? Please write down all of your work.



4. Sally has 15¢ to spend on candy. Licorice costs 5¢ for one piece and Tootsie Rolls cost 1¢ for one piece. Use a list to show all of the ways Sally can spend 15¢ on candy. Please write down all of your work.

Appendix B
2. Organizing Lists Quiz - Trial II

Name _____ Date _____

Teacher _____

1. Jane has 6 dimes, 5 nickels, and 5 pennies. One of the ways she can make 25¢ out of these coins is listed below. Complete the list.

Dimes	Nickels	Pennies	Total
2	1	0	25¢

2. Circle the number of different ways a pipe 16 feet long can be made using pieces of 2 feet pipe and 3 feet pipe.

   A. 1

   B. 2

   C. 3

   D. 4

   E. 5

3. Sandy has 6 dimes, 3 nickels, and 12 pennies in his pocket. He wants to use as many coins as possible to make 50¢. Circle the largest number of coins Sandy can use.

   A. 21

   B. 15

   C. 14

   D. 11

   E. 10

4. Two students have birthdays in the month of November. When their birth dates are subtracted you get 20. When their birth dates are added the sum is 34. Use a list and show when the two birthdays are. Please write down all your work.

5. Each radio station in Glendale has a 4 letter call sign. The first letter must be W. The next three letters are X, Y, and Z in different order. How many radio stations can there be and what are their possible call signs?

Name _____ Date _____

Teacher _____

1. Every bike in town has a license plate with a capital letter A, B, or C followed by a number 1, 2, or 3 followed by a small letter a or b. Some of the license plates are in the list at the right. Complete the list.

A1a
A2a
A3a
A1b
A2b
A3b
B1a

2. Circle the number of different ways 50¢ can be made from 6 dimes, 3 nickels, and 12 pennies.

   A. 2

   B. 3

   C. 4

   D. 5

   E. 6

3. I am thinking of two numbers. Their sum is 25 and their difference is 9. One of the numbers is listed below. Circle that number.

   A. 14

   B. 15

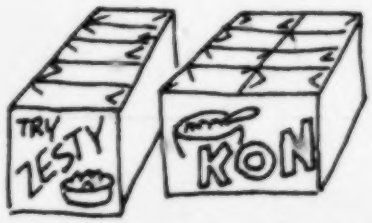
   C. 16

   D. 17

   E. 18

Form B

4. Each carton of Zesty cereal contains 5 boxes. Each carton of Kon cereal contains 8 boxes. How many cartons of each kind of cereal are needed to have exactly 60 boxes of cereal including both kinds? Please write down all of your work.



5. Sally has 15¢ to spend on candy. Licorice costs 5¢ for one piece and Tootsie Rolls cost 1¢ for one piece. Use a list to show all of the ways Sally can spend 15¢ on licorice and Tootsie Rolls. Please write down all of your work.

Appendix B

3. Editorial Feedback from Teachers on Organizing Lists Booklet - Trial I

Booklet

In general - Headlines be included; less writing on each page; more color pictures; dittos in appendix; begin each session with objective: _____, materials needed: _____, and directions: _____.

Introduction

page 1 - The two types of lists are not clear. The table is hard to understand.

page 2 - Example 2 is good. It might be easier if examples followed the type of list directly.

page 3 - (Activity 1) A review would be helpful of the second type of list.

- (Activity 2) This may not be clear to a person reading it for the first time.
- (Activity 4) Is "informal evaluation" the primary goal or is it to extend and reinforce?

Activity 1

page 4 - Omitted the puzzle problem. For problem 3, I provided catalogues for each student containing lower cost items. Money allowance was too low.

- Had a brief discussion on problem 2. Did not do problem 3. Gave a diagram of a market for problem 1.
- A diagram of the store was presented after the list was made.
- I did problem 1 (very good activity) and problem 3.

- On problem 1, first each student names a grocery-store item. Then everybody organizes the whole list.
- For problem 1 could use a cartoon ditto in appendix.

page 5
- For problem 4, groups made list and reported to class. Then stores and busy roads could be introduced to see if the routes would be changed.
- We did sheet #1, problem 4, together. Then sheet #2 was assigned.
- Problem 5 was omitted. Students have to schedule themselves every day.

Activity 2

page
- Problem 1d "purpose of entire activity".
- Problem 1c "most important".
- Problem 1d "most important".

page 8
- Problems too much alike.
- Problem 4 - complete but reasonable list.

page 9
- Problem 5 should be put in the deck.
- Problem 5 needs appendix problems.
- The list did not make sense.
- Problem 5 was very tough for determining categories.
- Since dogs is plural, is one (1) dog a possibility? The "boys" list is confusing.

Activity 3

page 10
- On problem 2 most students did not make lists.
- First label plates. Then label spot and put plates on spots.

- Problem 1 seemed to be a regression. I did not use a table. On problem 2, I found that some children could not find the factors of manipulation in a problem and/or could not set up the proper framework. Children needed to take the key of 3 from the drawing. Some did not realize this and could not set up a list. We discussed looking for clues in the problem and drawings if there was one.
- (second paragraph crossed out) All were teacher-student "together" problems.
- I suggest you separate according to type and not by teacher/student. Could make reference in the card deck to similar problems. Need to add tree diagrams.

page 11
- Cross out paragraph above problem 3. Worked all of the problems together.
- Problem 3 needs a third problem of greater difficulty.
- For problem 3 most students did not make organized lists.

page 12
- On problem 6, entry 5 4 9 should be changed to 5 4 0 and entry 5 0 2 should be added.
- Cross out paragraph above problem 5. Worked all of the problems together.

page 13
- The list itself is the solution.

Appendix B

4. Editorial Feedback from Teachers on Organizing Lists Booklet - Trial II

Booklet

Lesson 1

page T1
line 1 - Change "to correctly...information" to "to organize information correctly".

page T4
line 6 - Change "page 1" to "page 2"

page 4 - Problem 2 should read "8th largest city".

page 5 - On item 2 students did not get idea they were to look at the second list.

Lesson 2

page 9 - Need more lines in the "doughnut" list. More questions need to be added to problem 2 to highlight for the students what they are learning. For example, "What do we have here?"

Lesson 3a

page 14 - Problem 2 takes too long if have too many kids. Some teachers had students use 10 of their classmates.

page 15 - Write the numbers 1, ..., 9 on the top of the page. Students did not know what to do with the numbers.

Lesson 4

page 23 - The way the problem is stated, the most you can buy is a total of 8. The answer given does not consider this.

Lesson 5

page 25 - Pattern to be used to construct an octahedron model should be included.

page T25 - Picture of the octahedron on this page should be the same perspective as the one on student page 25.

page 26 - Need a whole page for problem 2.

page 27 - Marble problem threw the students. Not enough practice with tree diagrams.

Lesson 6a

page 29 - Answer sheet lists 8 answers for problem 1 when there are really 10.

page 30 - The wording is off on problem 2. There are a lot more answers than given. Possibly use only two pennies. One answer is wrong on answer sheet for problem 2.

page 36 - The answer does not include a quarter.

Appendix B

5. Editorial Feedback from Teachers on
Organizing Lists Problem Deck - Trial I

Problem Deck

B02 - 1) Where do you start from?

2) Where do you end?

3) How many more letters will you have to go through to make it a 3-legged trip?

B04 - What is the smallest odd number?

What is the largest odd number?

B05 - Smallest coin possible?

Largest coin possible?

B06 - How many ways using MO at first?

How many ways using MN at first?

Is there any other combination using M as the first letter?

B07 - How many combinations using MA as the first?

How many combinations using MT as the first?

- As a class we discussed and looked for a method to organize. We figured out a method as a class, of checking our work to see if we had all of the solutions. (1-2-3-4)
- Use each letter once. (answer side) Four letter words only.

B08 - Hints: How many ways from WN to E?

How many ways from WD to E?

B09 - Let's call the numbers a and b. Make a list of all the a's and b's that add to 14. Then look at your list to see if any of those pairs equal 48 when multiplied.

- Most used a list starting at 13 in the first column and 1 in the second.

B010 - Two possible.

- Many children failed to do step 2 and find the answer after they made a list.

B011 - Some students worked better when allowed to work at the board. They did not give up as easily.

B012 - Most made the list (19, 28, 37, ...) after reading the problem and did not do (1 + 9 = 10, 2 + 8 = 10, ...).

B017 - This problem looks hard and most children would not take the time to think about it.

B018 - Problem shows numbers and answer is letters.

B021 - Many had stamps attached at the corners.

W03 - If P is 2, what are the possibilities for Q?
If P is 6, what are all the possibilities for Q?

W09 - Not necessarily a list problem.

W010 - Not a list problem really.

- Any problem that asks for a yes or no answer encourages guessing.
- What is her grade?

W011 - $20. not $.20.

W015 - Hints: 1) How many different letters can you go directly to from A?
2) If you go from A to F, how many ways can you go?
3) How many letters does it take to make a trip? What's first? What's last?

G01 - Class found a list very hard for this problem.

G04 - Some forgot that a point after is only after a touchdown.

G07,8 - On these problems the students could make a list quite easily, but did not understand how to use it to find the solutions. (There is more than one correct answer for each.)

G09 - Most did not use a list to solve.

G011 - Most students could not set up a plan to solve.

C013 - Children either seemed to have the logic and found the problem not difficult or found it impossible.

- Which boy is who

G014 - Hard to read and understand.

- Solution - 13, 37, 51.

G018 - What is the smallest score he can get?

- What is the largest score he can get?

Appendix B

6. Frequency of Students Trying Each Problem in Organizing Lists Problem Deck by Color and by Teacher Group

Problem Number	Blue Cards Teacher Groups			White Cards Teacher Groups			Green Cards Teacher Groups		
	11	12	13	11	19	34	11	12	13
1	103	69	109	38	19	34	22	12	8
2	67	49	78	43	21	26	21	5	6
3	79	54	76	25	13	22	15	4	3
4	44	32	73	40	22	35	10	5	3
5	48	23	41	15	8	14	11	1	4
6	84	43	91	46	26	35	32	11	14
7	65	43	75	10	8	16	33	7	7
8	35	26	66	29	10	20	24	9	6
9	69	29	58	56	20	53	13	5	2
10	77	26	44	14	6	36	3	3	1
11	41	10	33	10	2	29	3	2	0
12	48	13	37	6	4	7	3	5	0
13	44	17	39	25	21	26	28	3	11
14	55	14	50	6	6	21	1	3	2
15	60	14	29	8	19	9	3	1	0
16	34	14	22	17	11	28	2	1	0
17	22	3	17				11	5	4
18	52	8	36				5	1	1
19	56	15	46				7	6	4
20	48	7	37				2	3	2
21	32	12	16				17	8	4

Note: Teacher Group 11 - 6 classes for all colors
Teacher Group 12 - 6 classes for all colors
Teacher Group 13 - 8 classes with blue data, 6 classes with white, 4 classes with green

In some cases, data was recorded by groups of students.

For these, one frequency represents a group of 2, 3, or 4 students.